



Building Technologies Program

Better Buildings, Brighter Future



Innovative Building Technologies and Practices Save Energy and Money

Buildings use more energy than any other sector of the U.S. economy, consuming over 70% of electricity and over 50% of natural gas. Investing in energy-efficient technologies and practices allows building owners, developers, and operators to realize cost savings in homes and buildings that are more comfortable, productive and marketable.

Partnering with state and local governments, the building industry, academia and manufacturers, the Program:

- advances research and development of energy-efficient building technologies and practices
- works to improve building codes, appliance and equipment standards and guidelines for efficient energy use
- educates homeowners, builders and developers about returns they can realize by adopting energy-efficient technologies and practices

Expanding the Possibilities

The Program invests in advancing cutting-edge technologies. Innovations in energy-efficient “whole building” design (which optimizes building systems and

components), as well as building envelope and window technology, heating and cooling equipment, appliances and lights—combined with advances in renewable energy technology—have the potential to transform today’s buildings. These technologies and the whole building approach will produce buildings that use less energy.

For example, better building envelopes reduce heat loss and gain; this means the climate control system can be smaller, providing equivalent comfort and air quality. Smart sensors and controls further maximize savings by turning off lights or adjusting the thermostat in unoccupied spaces. Smaller electrical loads mean that supplemental renewable technologies, such as solar energy (photovoltaic systems [PV]) can be smaller and more cost-effective.

Around the country, high performance buildings like the Pennsylvania Department of Environmental Protection’s Cambria Office Building and Colorado’s BigHorn Home Improvement Center demonstrate the energy and environmental benefits of advanced building technologies. Homes utilizing best practices from BTP’s Building America research program

incorporate energy and material-saving technologies and building practices to use 30 percent less energy than comparable homes.

The Promise of Zero Energy Buildings

DOE R&D investments have a bold goal: net-zero energy buildings by 2025. These buildings will be 60 to 70 percent more energy efficient than current practice and will utilize renewable energy to supply their energy needs. The Program supports research in the engineering steps (such as technology integration) needed to achieve this goal at little cost to the consumer.

Raising the Bar

Buildings research also lays the groundwork for improved building codes and appliance and equipment standards. The Program works with regulatory groups, product manufacturers, utilities and others on test procedures and minimum efficiency standards for residential appliances and commercial equipment. Standards now in place for residential products are expected to save consumers nearly \$93 billion by 2020, and enough energy to operate all U.S. homes for approximately two years.

The Program supports development of ENERGY STAR® criteria for appliances, lighting, windows and doors. The Program then works with manufacturers, retailers and utilities to promote manufacture, sales and use of ENERGY STAR products.

In addition, BTP works with national code organizations, state and local jurisdictions and the building industry to upgrade model energy codes, based on research and emerging technologies. The Program provides technical and financial assistance to adopt, implement and enforce these model codes to provide a cost-effective baseline for new buildings. Since 1991, the energy cost savings produced exceed \$4.7 billion.

Promoting Widespread Use

To maximize energy savings and return on DOE R&D investments, the Building Technologies Program works to increase awareness of the energy, economic, and environmental benefits of using efficient building technologies and practices. The Program partners with state, industry, and energy partners on a variety of outreach activities, including:

- **Dissemination of residential building research results, resources, and tools.** Through industry and university partners, the Program educates builders, contractors and allied trades about the benefits of new technologies and techniques. Resources like the Building America Best Practices Guidelines offer climate-specific guidance for building energy-efficient new homes.
- **Education through states, universities, retailers, and others.** In areas afflicted by natural disasters, the Program encourages cost-effective, durable and efficient reconstruction. Training workshops for building professionals share information on disaster-resistant, energy-efficient technologies and practices.
- **Collaboration with ENERGY STAR partners to promote manufacture and use of ENERGY STAR products.** The ENERGY STAR label helps businesses and consumers identify efficient products, homes and buildings. Home

Performance with ENERGY STAR, an energy-efficient whole-house retrofit program, helps homeowners improve the comfort and efficiency of their homes through energy audits.

- **Development of building energy software and simulation tools** allows commercial building designers to model the savings potential of various energy options. Since 2001, more than 40,000 copies of DOE's EnergyPlus software have been downloaded.
- **Technical assistance services for existing commercial buildings.** DOE provides technical and institutional assistance to facilitate major energy efficiency or renewable energy improvements.
- Support of design competitions such as Lighting for Tomorrow promotes greater awareness of new technologies and their range of applications. BTP also supports the Solar Decathlon organized by the Solar Technologies Program.



Benefits for Our Homes, Our Businesses, and Our Nation

Energy-efficient buildings use less energy, cost less to operate, and improve comfort, saving money for homeowners and businesses alike. They help the environment by decreasing the need for new power generation and reducing harmful emissions, and increase our energy security. The Building Technologies Program invests in innovative technologies and practices to create better buildings and a brighter future.



A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



U.S. Department of Energy

Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

July 2006